



Forest Health Protection Pacific Southwest Region

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To: District Ranger, Eagle Lake Ranger District, Lassen National Forest

Subject: Evaluation of bark beetle activity in ponderosa and Jeffrey pine within the south Eagle Lake campgrounds (FHP Report NE08-03)

At the request of Rick Crowther, Supervisory Forestry Technician, Eagle Lake Ranger District, I visited the Merrill and Eagle campgrounds on March 19, 2008. The objective was to evaluate the current red turpentine (*Dendroctonus valens*) and western pine beetle (*Dendroctonus brevicomis*) activity, determine the potential for future bark beetle caused tree mortality and discuss treatment alternatives. These recommendations will address the immediate needs for high value, single tree protection and assist with the development of a long-term vegetation management plan for the campgrounds. Rick Crowther and Bill Woodruff accompanied me in the field.

Background

The Merrill and Eagle campgrounds are located at the south end of Eagle Lake about 10 miles northwest of Susanville, CA (T31N, R10E, Sections 13 and 14 and R11E, Section 18). The elevation of the site is 5100 feet and annual precipitation for the area is approximately 25 inches. Most stands are a mix of ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*) with scattered incense cedar (*Libocedrus decurrens*). High stand density, recent dry weather, compaction and construction activities have all contributed to an increase in bark beetle caused tree mortality within the campgrounds. The management objectives for this recreation area are to promote and maintain the presence of healthy trees, reduce the occurrence of hazard trees and limit further bark beetle caused tree mortality.

Observations

Western pine beetle is attacking and killing some of the larger ponderosa pines (> 15" DBH)

NORTHEASTERN CALIFORNIA SHARED SERVICE AREA
2550 RIVERSIDE DRIVE
SUSANVILLE, CA 96130
530-257-2151

Daniel Cluck
Entomologist
dcluck@fs.fed.us

Bill Woodruff
Plant Pathologist
wwoodruff@fs.fed.us

throughout both campgrounds but mortality is mostly concentrated within the Merrill campground where recent excavating associated with campground site improvements has disturbed the root zones of many trees. High numbers of red turpentine beetle attacks can also be found on most trees that are adjacent to reconstructed roads and new underground utility lines including some very large diameter (> 40" DBH) ponderosa and Jeffrey pine. Red turpentine beetle activity is also high in the Eagle campground despite the lack of recent disturbance.

Stand density in both campgrounds appears to be above recommended levels for reducing the risk of bark beetle caused tree mortality especially when considering the potential impacts of compaction from foot and vehicle traffic on site carrying capacity.

Discussion and Recommendations

Long-term

Trees in the Eagle Lake campgrounds, similar to most forested campgrounds, are exposed to additional stress factors that can compromise their health and vigor. Firewood collecting sometimes leads to tree wounding from hatchets and saws, foot and vehicle traffic from campers can result in increased soil compaction and root damage, and the desire for screening between campsites and increased canopy cover can result in overstocking of both understory and overstory trees.

Soil compaction in both campgrounds and recent excavations during construction within the Merrill campground may be partially responsible for predisposing the pines to bark beetle attacks. Compaction can reduce the water holding capacity of the soil. Compacted soils also tend to suffocate roots, limiting the available oxygen that is necessary for root growth and survival. Damaged and unhealthy roots cannot provide the upper portions of the tree with the water and nutrients it requires to maintain its natural defenses. Root damage is a long-term problem that may not reveal itself until several years after the damage has occurred. In order to minimize future soil compaction and root damage, campers should be confined to specific travel corridors from campsites to restrooms, water sources, and specific recreation areas. It is especially important to divert and limit foot and vehicle travel and restrict excavation for roads, trails and utilities as much as possible from the root zones of trees.

High stand density in both campgrounds is also playing a role in predisposing trees to bark beetle attacks. Excessive competition for limited water and nutrients puts stress on individual trees and reduces their ability to maintain an adequate defense system. Overstocked stand conditions may persist over time with limited bark beetle caused mortality until triggered by drought or other factors. Bark beetle caused mortality within a campground can result in a dramatic reduction in stocking, especially in the larger size classes, and an increase in the number of hazard trees that must be removed.

To increase health and vigor and reduce the risk of future bark beetle caused tree mortality, stands in both campgrounds should be thinned to a basal area appropriate for the site. When determining the carrying capacity of the site the effects of soil compaction should be considered as site quality may be reduced. In addition, where compaction exists, trees may not respond as expected after thinning treatments. In general, to reduce the susceptibility to future bark beetle caused tree mortality, stands should be thinned to densities that are 80% or less of "normal", effectively reducing tree competition for limited water and nutrients. Furthermore, selecting for

more drought tolerant species such as Jeffrey pine, ponderosa pine and incense cedar over white fir will make the stand more resilient to disturbance agents such as insects, disease, and fire.

White fir growing in this area are especially at risk to bark beetle attacks due to the low annual precipitation. The long-term average annual precipitation of 20 - 30" for this site is below what is generally required to sustain white fir over a generation (the lower limit of precipitation in the natural range of white fir is about 20 inches). Therefore, even with lower stocking levels, white fir growing on this site is at a high risk for fir engraver beetle caused mortality. High stand density combined with the last prolonged drought (1987-1992) resulted in elevated levels of white fir mortality throughout northeastern California as documented in previous FHP evaluations (Schultz 1994) and aerial surveys. During this time, the areas with the highest white fir mortality were those with less than 30" annual precipitation.

When planning thinning treatments, it should be recognized that the target stocking level is an average to be applied across the landscape and some variability may be desired. Individual high value trees, such as mature pine, as well as pure stands of younger ponderosa and Jeffrey pine should benefit by having the stocking around them reduced to lower levels. In addition, thinning can decrease the need to enter stands to conduct salvage operations, decrease the amount of fuel loading and reduce the number of hazard trees.

Short-term

The immediate problem within the Merrill campground is condition of the very large diameter pines. These pines are highly valued for their aesthetic and wildlife values and are a primary concern for the District. Most of these trees are currently infested with red turpentine beetles, which is an indication of very high tree stress. With the current western pine beetle activity in the campground and elevated levels of Jeffrey pine beetle activity in the nearby forest, these trees are at a very high risk of being successfully attacked and killed this season. These potentially hazardous trees, should they be killed by bark beetles, will be very costly and difficult to remove.

To immediately protect individual trees in the short-term there is basically one established option, application of preventative insecticides to the bole. Selected high value trees in the campgrounds would be treated with a registered pesticide by spraying the entire bole to the point of saturation. Trees would need to be treated prior to mid-May 2008, before the first beetle flight, to ensure that they are not attacked this spring. Insecticide treatments can provide protection up to two years against bark beetle attacks giving the District time to develop and implement long-term strategies to reduce overall tree susceptibility. Consideration needs to be given to the choice of insecticide since the campground is in close proximity to the lake.

General Recommendations for Campgrounds

Maintaining and promoting healthy trees are important objectives for development plans in campgrounds. Care should be taken during future campsite, trail and facility construction to minimize negative impacts on the landscape. The following guidelines should be applied for areas under construction or in areas where future construction will take place.

- Tree density should be appropriate for the site. This will provide access to light, moisture and nutrients and allow the trees to better cope with their altered environment.

- Trees that will directly interfere with structures or that will be seriously damaged during construction or excavation should be removed.
- Leave a mixture of ages and species to provide a continual forest canopy over the years.
- Fence off individual or groups of trees before construction to negate or minimize root damage by soil compaction or trunk and root damage by equipment. Protective fences should be placed, at a minimum, at drip line. Depending on the species, tree roots can exist within a radius two times the crown radius and encompass an area well beyond drip line. Drip line is defined by the outer edge of the foliage. Penalties for damaging trees should be incorporated into tree removal or construction contracts.
- Road or lot grades should be changed as little as possible. Grading damages roots and can set up conditions that favor soil erosion. It can also alter the contour such that the flow of surface and subsurface water is drastically affected.
- Trenches should always be dug away from tree roots.
- Do not back fill with earth or rocks around the trunks of trees.
- Avoid paving with either concrete or asphalt over root systems, or close to the trunks of trees.
- Use caution in applying wood preservatives and other chemicals to buildings. Trees and other plants have been killed by direct contact with them or as a result of their runoff in rainwater.
- Avoid leaving green pine slash on site to prevent the build up of pine engraver (*Ips pini*) beetle populations that may attack standing green trees.

Future construction or vegetation management activities that incorporate the above guidelines will help assure the existence of vigorous and healthy trees following project completion.

Despite the effectiveness of any long or short-term plans to prevent tree injury and mortality, some trees, through declining health, will eventually become hazards to the public. To minimize the risks associated with hazard trees, they should be identified and removed before they fail. The current practice for many National Forest campgrounds is to remove trees as they die. This eliminates the risk from dead trees but fails to address living trees that are infected with root disease, heart rot, and/or have a structural defect. These high-risk green trees are equally hazardous and should not be overlooked. Therefore, it is recommended that the Forest develop a hazard tree evaluation and monitoring plan for its campgrounds. At your request, Forest Health Protection can provide information and assist with the development of this plan. In the short-term, trees within the campground that have obvious stem decay, dead tops and/or large dead branches should be carefully evaluated and hazards removed or pruned as soon as possible. All standing dead trees within striking distance of campsites or campground facilities should be removed immediately.

Forest Health Protection Funding

Forest Health Protection funding is available for short-term prevention treatments on high value trees in the Merrill and Eagle campgrounds on a competitive basis. To receive this funding the District must begin to develop a long-term vegetation management plan to reduce the future risks of bark beetle caused tree mortality and ensure the continued presence of healthy trees that will provide shade, campsite screening and visual/aesthetic qualities.

Forest Health Protection can also assist with the funding, on a competitive basis, for the thinning and removal of green trees (including NEPA and vegetation plan development) from overstocked areas within and adjacent to the Eagle Lake campgrounds. If you are interested in this funding please contact the Forest Health Protection staff for assistance in developing and submitting a proposal.

If you have any questions regarding this report and/or need additional information please contact me at 530-252-6431 or dcluck@fs.fed.us.

/s/ Danny Cluck

Daniel R. Cluck
Entomologist
NE CA Shared Services Area

cc: Rick Crowther, Eagle Lake RD
Scott Stawairski, Eagle Lake RD
Dave Evans, Lassen SO
Forest Health Protection, Regional Office